

REMARKS

By this Response, no claims have been amended, added or canceled. Claims 1-6, 8-16, and 18-22 remain pending.

Rejection of Claims 1, 2, 4-6, 9, 10, 16, 19 and 20 Under 35 U.S.C. § 102(b)

In the Final Office Action, the Examiner rejected claims 1, 2, 4-6, 9, 10, 16, 19 and 20 under 35 U.S.C. § 102(b) as being anticipated by *Kondo et al.* (U.S. Patent No. 5,656,858). This rejection is respectfully traversed.

The subject matter of independent claims 1 and 16 are directed to methods comprising, *inter alia*, forming a surface conductive lead in an opening formed within a protective overcoat and over a barrier layer, the barrier layer providing additional adhesion between the protective overcoat and the surface conductive lead, a portion of the barrier layer extending beyond the surface conductive lead; providing a seed layer contacting the barrier layer and at least partially within the opening of the protective overcoat; and subjecting the portion of the barrier layer to a dry etch to remove the portion and form a skirt, the dry etch selective to the barrier layer.

It is the Examiner's position that *Kondo et al.* disclose a method for manufacturing an integrated circuit as claimed, referring specifically to FIGS. 7A-7E; column 3, lines 40-41 and element 101; elements 103, 104, 105, 108; column 10, lines 33-39; and column 7, lines 65-67.

To the contrary, it is respectfully submitted that *Kondo et al.* fail to teach each and every limitation of the claims. Specifically, *Kondo et al.* fail to disclose subjecting

the seed layer to a wet etch prior to subjecting the portion of the barrier layer to a dry etch.

Referring to those portions of Kondo et al. pointed out by the Examiner, it is respectfully submitted that the characterization thereof is not in keeping with the plain language of the reference. Instead, according to column 10, lines 33-39 of *Kondo et al.*, when a dry etch is used, it is used for all of the barrier metal 105, the bonding layer 106, the base film 107 and the bump part 108. When a wet etch is used, as described in column 9, lines 23-25, the wet etch is first applied to the Cu film 107 with an etching liquid which can selectively etch only Cu using the columnar bump part 108 as an etching mask. Then, both the Ti film (bonding layer 106) and the TiN film (barrier metal 105) are etched together wet etched with a Ti etching liquid. Thus all layers are either wet etched or dry etched. There is no disclosure in *Kondo et al.* in which a wet etch is applied to the seed layer and subsequently a dry etch is applied to the barrier layer to remove a portion of the barrier layer and form a skirt as claimed.

Because *Kondo et al.* fail to teach every limitation of the claims, no *prima facie* anticipation exists.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 1, 2, 4-6, 9, 10, 16, 19 and 20 under 35 U.S.C. § 102(b). Applicants respectfully submit that claims 2, 4-6, 9, 10 and claims 19, 20 are in condition for allowance, at least by virtue of their dependency from allowable claims 1 and 16, respectively.

Rejection of Claims 1 and 16 Under 35 U.S.C. § 102(b)/103(a)

In the Final Office Action, the Examiner rejected claims 1 and 16 under 35 U.S.C. § 102(b) as being anticipated by *Lee et al.* (U.S. Patent Publication No. 2002/0121692), or in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over *Lee et al.* (U.S. Patent Publication No. 2002/0121692) in view of *Bojkov et al.* (U.S. Patent Publication No. 2005/0073048). These rejections are respectfully traversed.

The subject matter of claims 1 and 16 has been characterized above. It is the Examiner's position that *Lee et al.* or *Lee et al.* in view of *Bojkov et al.* disclose the claimed invention.

In reply to the Examiner's specific comments in the "Response to Arguments", the "wet" etch of *Lee et al.* is intended to reduce the diameter of (i.e. undercut) the pillar (surface conductive lead). In distinction, the claimed wet etch specifically does not undercut the seed layer OR the surface conductive lead. It is not clear how the Examiner can interpret *Lee et al.* to wet etch a seed layer without undercutting the surface conductive lead (i.e. pillar metal 38) when that is the very result of the etch in *Lee et al.* The Examiner's further characterization that the undercutting of the seed layer/surface conductive layer is being defined as removal of the barrier layer during wet etch of the seed layer is also not understood because the barrier layer is claimed as being formed by a dry etch and not the wet etch. It therefore appears that the Examiner is reconfiguring the claimed invention to match the reference to *Lee et al.*, but to do so will require overlooking the presently claimed features. Further, there is no specific disclosure as to whether the "final two processing steps" of *Lee et al.* pertaining to etching the exposed surface of the barrier layer is by wet or dry etch, and it is therefore

submitted that *Lee et al.* also fail to disclose the claimed dry etch of the barrier layer to form a skirt.

Accordingly, the wet etch of *Lee et al.* is intended to undercut the pillar metal as shown in FIG. 14 and described in at least paragraph [0094] thereof. In distinction, the present invention uses a wet etch without substantially undercutting the etched seed layer or surface conductive lead as claimed.

With regard to the rejection combination of *Lee et al.* and *Bojkov et al.*, it is respectfully submitted that the wet etch of a seed layer in *Bojkov et al.* fails to overcome the deficiencies pointed out in connection with *Lee et al.* Thus, even in combination, the references to *Lee et al.* and *Bojkov et al.* fail to teach or suggest Applicants' claimed invention.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 1 and 16 under 35 U.S.C. § 102(b)/103(a).

Rejection of Claim 3 Under 35 U.S.C. § 103(a)

In the Final Office Action, the Examiner rejected claim 3 under 35 U.S.C. § 103(a) as being unpatentable over *Kondo et al.* (U.S. Patent No. 5,656,858) in view of *Ashby et al.* (U.S. Patent No. 5,814,238). This rejection is respectfully traversed.

Claim 3 depends from claim 2 and further comprises nitrous oxide in the dry etch.

It is the Examiner's position that *Ashby et al.* overcome the deficiency of *Kondo et al.* by teaching the etching of tungsten titanium alloys using a dry etch of carbon tetrafluoride and nitrous oxide.

It is respectfully submitted that the reference to *Kondo et al.* fails at the outset for reasons presented above. The addition of *Ashby et al.* does not overcome these deficiencies, and the combination therefore also fails to teach or suggest the claimed invention.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claim 3 under 35 U.S.C. § 103(a). Applicants further submit that claim 3 is in condition for allowance, at least by virtue of its dependency from allowable claim 1.

Rejection of Claims 8 and 18 Under 35 U.S.C. § 103(a)

In the Final Office Action, the Examiner rejected claims 8 and 18 under 35 U.S.C. § 103(a) as being unpatentable over *Lee et al.* (U.S. Patent Publication No. 2002/0121692) in view of *Bojkov et al.* (U.S. Patent Publication No. 2005/0073048). This rejection is respectfully traversed.

Claims 8 and 18 are directed to the wet etch chemistry comprising hydrogen peroxide and sulfuric acid.

It is the Examiner's position that *Bojkov et al.* overcome the deficiency of *Lee et al.* by etching a copper seed layer with a wet etch chemistry of hydrogen peroxide and sulfuric acid, referring to paragraph [0034] thereof.

To the contrary, it is respectfully submitted that the reference to *Lee et al.* fails at the outset for reasons presented above. The addition of *Bojkov et al.* does not overcome these deficiencies, and the combination therefore also fails to teach or suggest the claimed invention.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 8 and 18 under 35 U.S.C. § 103(a). Applicants respectfully submit that claims 8 and 18 are in condition for allowance, at least by virtue of their dependency from allowable claims 1 and 16, respectively.

Rejection of Claims 21 and 22 Under 35 U.S.C. § 103(a)

In the Final Office Action, the Examiner rejected claims 21 and 22 under 35 U.S.C. 103(a) as being unpatentable over *Kondo et al.* (U.S. Patent No. 5,656,858) in view of *Nye, III et al.* (U.S. Patent No. 5,503,286). This rejection is respectfully traversed.

Claims 21 and 22 are directed to a feature where a thickness of the skirt tapers down as it moves away from the surface conductive lead.

The Examiner recognizes that *Kondo et al.* do not explicitly disclose the resulting skirt to taper down as it moves away from the surface conductive lead. Accordingly, the Examiner has applied *Nye, III et al.*, referring specifically to FIG. 4A having layer 240 tapering out away from 300.

It is respectfully submitted that the reference to *Kondo et al.* fails at the outset for reasons presented above. The addition of *Nye, III et al.* does not overcome these deficiencies, and the combination therefore also fails to teach or suggest the claimed invention.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 21 and 22 under 35 U.S.C. § 103(a). Applicants

respectfully submit that claims 21 and 22 are in condition for allowance, at least by virtue of their dependency from allowable claims 1 and 16, respectively.

CONCLUSION

In view of the foregoing remarks, Applicants submit that this claimed invention is neither anticipated nor rendered obvious in view of the prior art references applied against this application. Applicants therefore request the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 20-0668.

Respectfully submitted,

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